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A MONITORING AND IDENTIFICATION SYSTEM

THIS INVENTION relates to a monitoring and identification system. In particular, it relates to a system for monitoring and identifying vehicles in a plurality of parking zones and to a device for use in the system. It also relates to a method of monitoring and identifying a vehicle in a parking zone.

WO 98 30982A and EP O 193 320A, respectively disclose so-called parking control units, i.e. portable devices for monitoring or checking whether or not a vehicle is legally parked. The devices are intended for use in parking systems of the kind in which a user is required to enter, inter alia, a vehicle registration number into a remote database in order to register the vehicle as a legally parked vehicle. The devices are able to communicate with the remote database in order to obtain the registration numbers of vehicles which are legally parked. The devices do not function as parking meters.

US 5 745 052 discloses a parking control system for the parking lot of a department store. The system comprises an entry device at the entry of the parking lot, which device issues a parking ticket and an exit device at the exit of the parking lot which is able to read the parking ticket and determine whether a fee is payable. The exit device includes input means, for the input of a vehicle registration number into the device and communication means for communicating with a remote

station where a check is made to identify whether the vehicle has been stolen. US 5 745 052 does not disclose a portable parking meter.

WO 99 10844 discloses a system for debiting, collecting and distribution of parking fees using a cellular or mobile phone. In this system, a mobile telephone is used to register a vehicle as a validly parked vehicle, and a parking check is performed by a roving parking attendant who accesses the database containing the registration numbers of all such registered vehicles. The database is accessed remotely using an internet browser combined with a mobile telephone.

WO 99 10844 does not disclose a portable parking meter.

According to the invention, there is provided a device for monitoring and identifying a vehicle in at least one parking zone, the device including

a housing shaped and dimensioned to be hand-held within which is housed:

input means for feeding input identification particulars of a vehicle in a parking zone into the device;

communication means for receiving reference identification particulars of vehicles communicated from a remote station to the device;

storage means for storing said reference identification particulars; timing means for timing the duration for which the vehicle is parked in the parking zone;

processor means connected to the input means and to the storage means, the processor means including comparator means for comparing the input identification particulars with the reference identification particulars, the processor means being operable to calculate a monetary

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amount due for parking for said duration in the parking zone so that the device functions as a parking meter;

signal generation means for selectively generating a warning signal in response to the comparison;

- 5        display means for displaying the monetary amount due; and  
monetary receiving means for receiving the monetary amount due.

Further in accordance with the invention, there is provided a device for monitoring and identifying a vehicle in at least one parking zone, the device including

- 10      a housing shaped and dimensioned to be hand-held within which is housed:

input means for feeding input identification particulars of a vehicle in a parking zone into the device;

- 15      communication means for sending the input identification particulars to a remote station and for receiving the result of a comparison performed at the remote station between the input identification particulars and the reference identification particulars in order to identify the vehicle;

- 20      signal generation means for selectively generating a warning signal in response to said result;

timing means for timing the duration for which the vehicle is parked in the parking zone;

processor means for calculating a monetary amount due for parking for said duration in the parking zone;

- 25      display means for displaying the monetary amount due; and  
monetary receiving means for receiving the monetary amount due.

The monetary receiving means may include card reading means for reading information stored on a card and feeding it to the processor means for processing payment electronically.

The processor means may define the timing means.

5           The identification particulars may be displayed on the display means. In the event of the particulars corresponding, the observed particulars may be checked prior to generating the warning signal. The storage means may thus include data defining a rate payable by the driver, e.g. a rate per hour during the day, during the evening, and  
10           so on.

The device may include a printer for printing a hard-copy of selected data.

15           The input means may include a keypad via which the identification particulars of the vehicle and the parking zone are manually entered. In addition or instead, the input means may include a reader capable of reading in a wireless fashion a tag device in or on the vehicle, the tag device carrying the said identification particulars of the vehicle. The identification particulars are typically particulars observed by a supervisor and fed into the device.

20           The communication means is typically a wireless communication link.

In other embodiments, the communication channel may be a hardwired link, an RF link, or any other conventional communication link.

In certain embodiments, the device includes enabling means  
5 for selectively enabling the device. The enabling means may be defined by the processor means and the input means in such a fashion so that upon entry of a correct PIN number the device is enabled. The PIN code may be communicated between the base station and the remote unit.

The reference identification particulars are typically  
10 reference identification particulars of stolen vehicles. Accordingly, the reference particulars may be the make, colour, registration number or the like of the vehicle.

The housing is preferably waterproof.

Further in accordance with the invention, there is provided  
15 a system for monitoring and identifying vehicles in a plurality of parking zones, the system including

a remote station at which reference identification particulars of vehicles are stored; and

at least one device for identifying a vehicle parked in one of a  
20 plurality of parking zones with which the device is associated, the device including a housing shaped and dimensioned to be hand-held within which is housed:

input means for feeding input identification particulars of a vehicle parked in a parking zone into the device;

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communication means for sending the input identification particulars to the remote station for comparison with the reference identification particulars and receiving the result of said comparison;

- 5 signal generation means for selectively generating a warning signal in response to said result;

timing means for timing the duration for which the vehicle is parked in the parking zone;

processor means for calculating a monetary amount due for parking for said duration in the parking zone;

- 10 display means for displaying the monetary amount due; and monetary receiving means for receiving the monetary amount due.

Further in accordance with the invention, there is provided a system for monitoring and identifying vehicles in a plurality of parking zones, the system including

- 15 a remote station at which reference identification particulars of vehicles are stored;

- at least one device for identifying a vehicle parked in one of a plurality of parking zones with which the device is associated, the device including a housing shaped and dimensioned to be hand-held within  
20 which is housed:

input means for feeding input identification particulars of a vehicle parked in a parking zone into the device;

communication means for receiving the reference identification particulars from the remote station;

- 25 storage means for storing said reference identification particulars; timing means for timing the duration for which the vehicle is parked in the parking zone;

processor means connected to the input means and to the storage means, the processor means including comparator means for comparing the input identification particulars with the reference identification particulars, the processor means being operable to calculate a monetary amount due for parking for said duration in the parking zone so that the device functions as a parking meter;

signal generating means for selectively generating a warning signal in response to the comparison;

display means for displaying the monetary amount due; and  
monetary receiving means for receiving the monetary amount due.

The communication means may be a wireless communication means.

The monetary receiving means may include card reading means for reading information stored on a card and feeding it to the processor means for processing payment electronically.

The input means may include a reader capable of reading a tag device hidden in or on the vehicle in a wireless fashion, the tag device carrying the said identification particulars of the vehicle.

In certain embodiments, the system includes a control centre and a plurality of remote stations at remote locations associated with parking zones, each remote station being in communication with the control centre via a telecommunication network to receive reference identification particulars and each device being in wireless communication with an associated remote station.

The telecommunication network is typically a cellular telephone network. Accordingly, the reference identification particulars may be downloaded by means of SMS messaging.

5 In certain embodiments, the telecommunication network is  
the Internet.

10 The remote station may include alternate communication means for communicating with other databases. For example, the base station may include a further communication interface arranged to interface with NATIS (National Traffic Information Service). The 15 interface may be configured to communicate via the Internet to NATIS, law enforcement authorities, or the like. A plurality of regional base stations may be provided which are each linked via a communication network, e.g. the Internet, to a national control centre.

15 Still further in accordance with the invention, there is provided a method of monitoring and identifying a vehicle in a parking zone, the method including

20 feeding identification particulars of a vehicle in a parking zone into a hand-held device;

transmitting the identification particulars to a remote station;

comparing said identification particulars of the vehicle in the parking zone with reference identification particulars at the remote station;

selectively generating a warning signal in response to the comparison;

25 timing the duration for which the vehicle is parked in the parking zone;

calculating a monetary amount due for the said duration; and receiving said monetary amount due.

The reference identification particulars are typically the identification particulars of stolen vehicles.

- 5           A database may be provided in the device for storing reference identification particulars of vehicles and the method may include updating the database periodically with reference identification particulars from the remote station. The method may include communicating the identification particulars in a wireless fashion from  
10          the device to the remote station at which the database is located.

The invention is now described, by way of example, with reference to the accompanying diagrammatic drawings.

In the drawings,

Figure 1 shows a system or installation, in accordance with the  
15 invention, for monitoring the use of zones or parking bays;

Figure 2 shows a schematic representation of a device or remote unit, also in accordance with the invention, of the installation of Figure 1;

Figure 3 shows a schematic block diagram of the remote unit of  
20 Figure 2;

Figure 4 shows a schematic circuit diagram of the remote unit of Figure 3;

Figure 5 shows a schematic flow chart of information in the system or installation; and

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Figure 6 shows the device or remote unit installed at a parking area including a plurality of parking zones or bays.

Referring to the drawings, reference numeral 10 generally indicates an installation or system, in accordance with the invention, for monitoring the use of a plurality of parking zones or bays 12 (only a few of which are shown and referenced in the drawings). The installation 10 includes a national control centre 13 which is connected via a communication link 14, e.g. the Internet, to a plurality of base stations 16 (only a few of which are shown in the drawings) which are located in various parts of the country e.g. in various suburbs, shopping centres, or the like. Each base station 16 is remotely connected to a plurality of portable remote units 18 via a conventional cellular telephone network 20. The parking bays 12 are arranged in groups, each group being associated with a specific portable remote unit 18 which is allocated to a supervisor (not shown) who, with the aid of the portable remote unit 18, monitors the use of the parking bays 12 as described in more detail below. In other embodiments of the invention, the remote units 18 communicate with the base stations 16 using conventional RF transceivers (not shown).

The national control centre 13 is linked to NATIS via a digital communication link, e.g. the Internet, so that reference identification particulars such as the model, make, colour, or registration particulars of vehicles, e.g. stolen vehicles, may be fed into its internal storage means. The national control centre 13 thus includes comprehensive details on vehicles such as stolen vehicles which may then be communicated via the communication link 14 to each base station 16 where the particulars are stored in its internal memory. Each

remote unit 18 includes a memory 22 (see Figures 2 and 3) in which a database of reference identification particulars of vehicles is stored. The reference identification particulars are downloaded from the base station 16 via the conventional cellular telephone network 20 in the form of  
5 SMS (Short Message System) messages. During the course of the day if further reference identification particulars e.g. particulars of a vehicle which has been stolen during the course of the day are required, these particulars may be instantaneously downloaded into the memory 22 via the network 20.

10                 The portable remote units 18 include a housing which is water-proof and which is shaped and dimensioned to define a hand-held unit which includes its various components. The remote unit 18 includes a display 24 (see Figures 2 to 4) for displaying various information to the supervisor, as described in more detail below. The remote unit 18 further includes input means in the form of a keypad 26, a warning LED  
15 30, a receipt printer 32, a power supply unit 34 which includes a lithium re-chargeable battery for powering the remote unit, a cellular interface 36 which is operable to receive and transmit data via the conventional cellular telephone network 20, and reading means for reading monetary  
20 value from a smart card, a credit card, or the like.

When a driver of a vehicle requiring use of a particular parking zone or bay has parked his car, the supervisor of the group of parking bays in which the specific bay is located approaches the vehicle and, via the keypad 26 of his remote unit 18, enters observed  
25 identification particulars of the vehicle into the remote unit 18. The observed identification particulars are typically the registration number of the vehicle and the processor unit 28 then access the memory 22 in

which a database of vehicle particulars are stored. Reference particulars corresponding to the registration number are then retrieved from the memory 22 and displayed on the display 24. The reference particulars typically include the make, colour, model etc. of the vehicle and the 5 supervisor then visually compares these particulars with the vehicle parked in the parking bay. In the event of there being a mismatch between the reference particulars and the observed particulars, the supervisor may then alert the relevant authorities by communicating a warning signal to the base station 16 associated with the particular 10 remote unit 18.

Further, the memory 22 includes comprehensive details on vehicles which are being illegally used e.g. stolen vehicles or the like. The processor unit 28 thus compares the registration number which has been fed in via the keypad 26 with a database of stolen vehicles in the 15 memory 22 and, if the comparison is positive, the processor unit 28 activates the warning LED 30 thereby to alert the supervisor. The supervisor may then double check that the vehicle registration number which he has fed in via the keypad 26 is correct by comparing the observed registration number of the vehicle with the particulars entered 20 in via the keypad 26 and which are displayed on the display 24. If the correct registration number has in fact been entered, the warning signal may be either automatically, or in response to an action of the supervisor, be transmitted via the cellular interface 36 to the associated base station 16. The associated base station 16 may then alert the 25 relevant authorities e.g. the police or the like. It is however to be appreciated that, instead of the cellular communication link 20, a radio link, a wired link via a conventional hardwired telephone system, an Internet link or the like may be used to communicate between the base

station 16 and the remote unit 18 or used to communicate between the base stations 16 and the control centre 13.

In addition to entering the vehicle registration number into the remote unit 18, each parking bay 12 associated with the specific remote unit 18 is numbered and an identification number of the specific parking bay is also entered into the remote unit 18 via the keypad 26. Once parking of the vehicle in the specific parking bay has been authorised, timing means defined by the processor unit 28 for timing the duration of the vehicle in the parking bay is then initialised. The processor unit 28 retrieves reference data from the memory 22 which may be selectively downloaded into the memory 22 from the base station 16. The processor unit 28 then calculates the rate of charge dependent on the time of day, day of the week, class of parking area, or the like.

The display 24 is typically a ten line 30 digit LCD display which, under control of the processor unit 28, displays the registration number of the vehicle, the number of the parking bay in which the vehicle is parked, the time and date, the rate per hour for use of the parking bay, or the like. Once the supervisor has received payment for use of the parking bay and entered payment details into the remote unit 18 via the key pad 26, the display may confirm payment by displaying "Thank you. Payment made before departure. Pay only the amount on the screen". It is to be appreciated however that any other messages may be displayed on the display 24. The processor unit 28 may thus keep financial records of the financial transactions that take place during the course of the day and may then transmit comprehensive details to its associated base station 16. The base station 16 also includes processor

means for generating statistics on the use of the various parking bays, running accounts on the total amount of cash received or the like.

In the event of the user not paying the supervisor the required amount, the remote unit 18 may communicate the reference 5 particulars of the vehicle to the base station 16 which may then notify the relevant local authorities in order to take legal action. In order to facilitate payment to the supervisor, the reading means 38 is provided for receiving smart cards, credit cards, or the like. A facility is typically provided in the remote unit 18 to provide benefits for regular or monthly 10 parking users. In certain embodiments, the remote unit 18 includes a transponder interrogator for interrogating an electronic tag provided on the vehicle. The electronic tag includes the identification particulars of the vehicle. In other embodiments, the electronic tag may be provided in the form of a key-ring.

15           The remote unit 18 is arranged so that the user may prepay for use of the bay for a specific period of time or pay the supervisor upon returning to collect the vehicle. In the event of the user prepaying the supervisor, the printer 32 may print the appropriate receipt in advance. However, in the event of the user only paying the supervisor upon 20 returning to the vehicle, the identification number of the parking bay is entered into the portable unit 18 which then displays the registration number of the vehicle presently parked in the bay. The processor unit 28 then calculates the amount due and display 24 then indicates that this amount must be paid directly to the attendant. It is to be 25 appreciated that they display 24 may then further display various other messages such as "Not paid yet", "If not paid legal action will follow from the local authority" or the like.

In order to avoid unauthorised use of each remote unit 18, each supervisor is furnished with a unique identification code or PIN number which is fed into the processor unit 28 via the keypad 26. If the PIN number matches a reference PIN number in the memory 22 the 5 remote unit 18 is activated or enabled. The reference PIN number may be downloaded from the base station 16 via the network 20.

Figure 3 of the drawings shows an embodiment of electronic circuitry of the remote unit 18. The unit 18 includes a conventional cellular telephone antenna 40 which is connected via line 9 42 to a standard cell phone receiver including a conventional pre-amp, 0 local oscillator, mixers, IF amplifiers and detectors. The receiver 44 is 0 coupled to a detector/decoder 46 which, in turn, is connected to the 0 memory 22 and to the display 24 and a logic amplifier and digital 0 interface. The unit 18 includes a PC compatible interface 48 for 0 connection to computing facilities at the base station 16. Further, a 0 transmitting arrangement 50 and a standard cellular telephone 0 transmitter 52 are provided for communicating with the base station 16. 10 A typical circuit diagram of the device or remote unit 18 is shown in 15 Figure 4.

20 In the embodiment of the invention shown in Figures 1 to 4 of the drawings, the reference identification particulars are downloaded and stored in the remote unit 18. However, in other embodiments of the invention, as shown in Figure 5, the reference identification particulars are stored in the remote or base stations 16. In this embodiment, the 25 vehicle identification particulars are fed into the device or remote unit 18 either manually or remotely by means of an electronic tag as shown in block 80 in Figure 5. The device 18 then communicates the

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identification particulars via its transmitter arrangement 50 to an associated base station 16 which is part of a local area computer as shown at block 82. At the base station, the reference identification particulars are compared with the identification particulars fed into the  
5 device 18 and, if the vehicle particulars match those of a stolen vehicle, as shown at block 84, a link to the relevant authorities is provided as shown at block 86. The base station 16 may then retrieve reference vehicle particulars such as the colour, the make, or model of the vehicle and communicate them back to the device or remote unit 18 whereupon  
10 the data is displayed on its display 24. As shown at block 88, the supervisor may then compare the identification particulars received from the base station 16 in order to ascertain whether or not erroneous data has been entered into the remote unit 18. If there is a mismatch of data, the remote unit 18 may communicate a warning signal to the relevant  
15 authorities as shown by line 90.

Once the relevant identification particulars have been entered by the supervisor into the remote unit 18, the motorist can then go shopping whilst the car is being supervised by the supervisor. Upon entry of the vehicle identification particulars into the remote unit 18, a  
20 timer is set to time the duration for which the vehicle will be parked in the parking zone 12 so that an appropriate charge may be calculated upon return of the motorist. As shown at block 92, once the motorist returns to the parking bay or zone 12 data on the relevant parking bay is entered into the remote unit 18 which then calculates a monetary  
25 amount due for use of the parking bay. As shown at block 94, all payments received are communicated to the remote stations 16 for accounting purposes. Summaries of all financial transactions may then

be communicated to the control centre 13 as generally indicated by block 96.

Referring in particular to Figure 6 of the drawings, reference numeral 100 generally indicates the arrangement of parking zones 12 proximate a roadway 102. As mentioned above, each vehicle may include an electronic tag which contains the identification particulars of the vehicle. Accordingly, a remote interrogator 104 may be located proximate the parking zone 12 to read the electronic tag provided on the vehicle. In addition or instead, a conventional automated monetary value receiving device is provided.

The installation or system 10 provides a facility at the national control centre 13 to monitor use of a legal vehicle registration number at different locations or areas throughout the country. In particular, similar vehicle registrations are monitored and time durations between monitoring of the same registration number are determined to see if the distance travelled by the vehicle is feasible. If it appears that duplicate registration numbers exist, the appropriate authorities may be contacted for legal action.

The inventor believes that the invention, as illustrated, provides an enhanced installation 10 for monitoring the use of and identifying stolen vehicles. As the registration number of the vehicle requiring use of the parking bays is entered into the remote unit 18, each time a vehicle is parked the registration particulars may be compared with a reference database to identify the illegal use of vehicles.